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Carbon Markets in Context: Into Which Component of Holdren's Equation Do They Fit

CARBON MARKETS IN CONTEXT: INTO WHICH COMPONENT OF HOLDREN'S EQUATION DO THEY FIT?

ROBERT HARDAWAY[†]

INTRODUCTION

Carbon markets should be analyzed in the context of their potential as a practical and efficient means of reducing the ecological footprint of humans on the earth.¹

An equation for measuring that ecological footprint was first developed in the 1970s in the course of a debate between Paul Ehrlich, Barry Commoner, and John Holdren.²

That equation³ measures the human ecological footprint (I) as the multiple of total population (P), ecological impact per unit of consumption (U), and consumption per capita (C): $I = PUC$.

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1. See BARRY COMMONER, *THE CLOSING CIRCLE: NATURE, MAN AND TECHNOLOGY* 291 (Alfred A. Knopf ed., 1971); PAUL R. EHRLICH, *THE POPULATION BOMB* (19th prtg., 1970) (Paul R. Ehrlich is a Bing Professor of Population Studies in the Department of Biologic Sciences at Stanford University.); ROBERT M. HARDAWAY, *POPULATION, LAW, AND THE ENVIRONMENT* 17 (1994) (citing DANIEL D. CHIRAS, *ENVIRONMENTAL SCIENCE: ACTION FOR A SUSTAINABLE FUTURE* 5 (1991)); Paul R. Ehrlich, *Human Natures, Nature Conservation, and Environmental Ethics*, 52 *BIOSCIENCE* 1, Jan., 2002, (Magazine), at 31; Paul R. Ehrlich & John P. Holdren, *Impact of Population Growth*, 171 *SCIENCE* 3977, Mar. 26, 1971, (Magazine), at 1212-17; Paul R. Ehrlich & John P. Holdren, *Population and Panaceas: A Technological Perspective*, 19 *BIOSCIENCE* 12, Dec., 1967, (Magazine), at 1065; David Harrison, Jr., & Daniel Radov, *Clean Air: Law, Policy and Practice*, SN038 A.L.I.-A.B.A. 201 (2007) (discussing emissions trading for air quality and climate change in the United States and Europe); John P. Holdren, *Population and the Energy Problem*, 12 *POPULATION & ENV'T* 3, 231 (1991) (John P. Holdren is Professor of Environmental Science and Public Policy at Harvard University.); Frederick A.B. Meyerson, *Commentary, Population, Carbon Emissions, and Global Warming: The Forgotten Relationship at Kyoto*, 24 *POPULATION & DEV. REV.* 115, 115-30 (1998).

2. See Holdren, *Population and the Energy Problem*, *supra* note 1, at 242-49.

3. Holdren's original equation used the letter "A" to represent consumption per capita, and "T" to represent impact per unit of consumption, rendering $I = PAT$. See *id.* at 242-43; see also COMMONER, *supra* note 1; PAUL R. EHRLICH & ANNE H. EHRLICH, *THE POPULATION EXPLOSION* 58 (1990) (Anne Ehrlich is a Senior Research Associate in Biologic Sciences at Stanford University); INSTITUT NATION, *CONSEQUENCES OF RAPID POPULATION GROWTH IN DEVELOPING COUNTRIES* 161-90 (1991) (discussing Barry Commoner, *Rapid Population Growth and Environmental Stress*); Thomas Dietz & Eugene A. Rosa, *Effects of Population and Affluence on CO₂ Emissions*, 94 *PROC. NAT'L ACAD. SCI. U.S.A.* 1, 175 (1997) (Thomas Dietz is a Professor in the Department of Sociology and Anthropology at George Mason University; Eugene A. Rosa is a Professor in the Department of Sociology at Washington State University.); Paul R. Ehrlich & Anne H. Ehrlich, *The Population Explosion: Why We Should Care and What We Should Do About It*, 27 *ENVTL. L.* 1187, 1188 (1997).

I. THE "U" FACTOR

Environmental policy and spending to date has placed the greatest emphasis on the "U" component, spending billions globally to reduce the pollution generated by individual units of consumption. For example, catalytic converters have been mandated for cars in the U.S. and scrubbers mandated for factory or power industry smokestacks. That this emphasis may have been misdirected was first recognized by former Environmental Protection Agency (EPA) director Lee Thomas, who observed that much of such environmental policy, to a significant degree, has merely transferred pollution in "one medium [such as the air] to another [such as soil or water] At best it is misleading—we think we are solving a problem and we aren't. At worst, it is perverse—it increases [rather than reduces] pollution."⁴

An example of the latter is the catalytic converter which, while reducing hydrocarbon emissions by a modest 12 percent, increased noxious oxide emissions by 28 percent.⁵

Hopes for an escape from this "circle game" have been generated by calls for use of "alternative energy sources" to reduce the pollution generated by each unit of production—thus the call for use of electric cars, bio-fuels, and solar or wind-generated power. Only recently have such agendas been called into question, as bio-fuels have been shown to require high levels of energy input in proportion to output (and thereby putting a strain on world food supplies);⁶ electric cars have been shown to rely upon electricity produced either by carbon-emitting power plants, or worse, nuclear power;⁷ solar farms have been attacked for ravaging the landscape⁸ and windmills assailed as "Cuisinarts for birds"⁹ and

4. HARDAWAY, *supra* note 1, at 43.

5. *Id.* at 162.

6. See Jacqueline Lang Weaver, *The Traditional Petroleum Based Economy: An "Eventful" Future*, 36 CUMB. L. REV. 505, 578-79 (2005/2006) (Jacqueline Lang Weaver is an A.A. White Professor of Law at the University of Houston Law Center.); see also Paul R. Ehrlich, Anne H. Ehrlich, & Gretchen C. Daily, *Food Security, Population and Environment*, 19 POPULATION & DEV. REV. 1, 7-18 (1993); Mario Giampietro, Sergio Ulgati, & David Pimentel, *Feasibility of Large-Scale Biofuel Production*, 47 BIOSCIENCE 9, Oct., 1997, (Magazine), at 587-96; John Manual, *Battle of the Biofuels*, 115 ENVTL. HEALTH PERSPECTIVES 2, A93-A95 (2007); David Tilman, Jason Hill, & Clarence Lehman, *Carbon-Negative Biofuels from Low-Input High-Diversity Grassland Biomass*, 314 SCIENCE 1598, Dec., 2006, (Magazine), at 1598-1600 (David Tilman, Jason Hill and Clarence Lehman are all Professors in the Department of Ecology, Evolution and Behavior at the University of Minnesota. Jason Hill is also a Professor in the Department of Applied Economics at the University of Minnesota).

7. See Taly L. Jolish, *Negotiating the Smog Away*, 18 VA. ENVTL. L.J. 305, 330 (1999); see also Lester B. Lave, Chris T. Hendrickson, & Francis Clay McMichael, *Environmental Implication of Electric Cars*, 268 SCIENCE 5213, May, 1995, (Magazine), at 993-95 (Lester B. Lave is a Higgins Professor of Economics and Industrial Administration; Chris Hendrickson is a Professor and Associate Dean of Engineering; and Francis McMichael is a Blenko Professor of Environmental Engineering at Carnegie Mellon University).

8. Avi Brisman, *The Aesthetics of Wind Energy Systems*, 13 N.Y.U. ENVTL. L.J. 1, 6-8 (2005); see also PETER HARPER, *Why I Hate Wind Farms and Think There Should Be More of Them*, in ENERGY ALTERNATIVES 106, 107 (Helen Cothran ed., Greenhaven Press 2002); Stephen G. Bell,

worse than the ravages of strip mining, "Salvador Dali's worst nightmare";¹⁰ geothermal schemes have been attacked as raising the risks of catastrophic earthquakes;¹¹ and clean water power produced by dams has been decried as threatening delicate and fragile ecosystems.¹²

A dramatic example of the latter was the case of *Tennessee Valley Authority v. Hill*,¹³ in which the Supreme Court upheld the shutting down of the virtually completed Tellico Dam and Reservoir Project, which would have provided a clean energy alternative to coal-burning and nuclear plants and improved economic conditions for impoverished residents of the area surrounding the dam. Despite the fact that over 100 million dollars had already been expended on this attempt to find an "alternative energy source," the Court shut down the dam on grounds that the dam would have threatened one of 130 known species of "snail darter"¹⁴—this during a period of human history in which the unchecked expansion of the human race is causing the extinction of an entire living species every day and the extinction of one vertebrate species every nine months.¹⁵

While no one would discourage the continuing quest for alternative energy sources, it is becoming increasingly clear that the notion that any such source is ever going to permit the pollution-free but exponential expansion of the human race is largely illusory.

In any case, even if miraculous new technological developments were to permit a significant reduction in the pollution emitted by individual units of consumption, the exponential expansion of the number of units to accommodate an ever-expanding human race more than offsets

Comment, *The Way the Winds are Blowing These Days: The Rapid Growth of Wind Energy and Legal Hurdles of North Carolina's General Statutes*, 8 N.C. J. L. & TECH. 117, 125 (2006).

9. Brisman, *supra* note 8, at 70; Morgan Winn Tingley, *Effects of Offshore Wind Farms on Birds: Cuisinarts of the Sky or Just Tilting at Windmills?* 54 (March 2003) (unpublished B.A. thesis, Harvard University); *see also* HARPER, *supra* note 8, at 107.

10. *See* Maria Goodavage, *Battling Safe Windmills: Bird Deaths in Turbines Spur Outcry*, USA TODAY, May 27, 1993, at 3A.

11. Darlene A. Cypser & Scott D. Davis, *Liability for Induced Earthquakes*, 9 J. ENVTL. L. & LITIG. 551, 557-58 (1994) (Cypser is a private practitioner in Boulder, CO; Davis is a geophysicist with the U.S. Geological Survey at the Center for Earthquake Research and Information.).

12. N. Leroy Poff, J. David Allan, Mark B. Bain, James R. Karr, Karen L. Prestegard, Brian D. Richter, Richard E. Sparks & Julie C. Stromberg, *The Natural Flow Regime*, 47 BIOSCIENCE 769, 769 (1997) (Leroy Poff is an Assistant Professor in the Department of Biology at Colorado State University; David Allan is a Professor at the School of Natural Resources & Environment at the University of Michigan; Mark Bain is a Professor in the Department of Natural Resources at Cornell University; James Karr is a Professor in the Departments of Fisheries and Zoology at the University of Washington; Karen Prestegard is an Associate Professor in the Department of Geology at the University of Maryland; Brian Richter is national hydrologist at the Nature Conservancy in Hayden, Colorado; Richard Sparks is the Director of the River Research Laboratories at the Illinois Natural History Survey; Julie Stromberg is an Associate Professor in the Department of Plant Biology at Arizona State University).

13. 437 U.S. 153, 172 (1978).

14. *Id.* at 171-72.

15. CHIRAS, *supra* note 1, at 5.

any reduction in pollution per unit. Thus, even if the pollutant emissions of automobiles could be reduced by 10 percent, the production of millions of additional automobiles to serve the needs of China and India alone would more than offset the reduction in emissions from individual automobiles far into the foreseeable future.¹⁶

In short, environmental efforts directed primarily toward reducing the pollution emitted by individual units must inexorably lead to the taking of one step forward and three steps backward in the quest for reducing mankind's ecological footprint on the earth.

II. THE "C" FACTOR

There is a growing political pop-trend toward placing significant environmental hopes on reducing the "C" component of Holdren's equation by urging or mandating the reduction of consumption per capita.¹⁷

In fact, however, the notion of reducing consumption per capita is not a new idea. Indeed it was tried—though involuntarily—in the 1930s all around the world. It was called the Great Depression, and most people did not like it.¹⁸ The resurrection of this idea, first popularized by Al Gore in his book *Earth in the Balance*, comes at an unfortunate time when millions of people in the Third World and developing countries are striving to emerge from poverty and achieve a better life. Proponents of pursuing the "C" agenda are especially horrified at the prospect that millions of consumers in China and India may soon be driving cars and living a lifestyle previously enjoyed in the developed world. Indeed, when it was reported in early 2008 that an automobile manufacturer in India planned to produce a four passenger car listing for \$2,500 that would make cars available to millions of people around the world who could not previously afford it, the New York Times ran an editorial decrying the environmental impact of so many former poor people driving cars.¹⁹

Other environmentalists pushing the "C" agenda attempt to avoid the perception of such cynical elitism by asserting that the burden of reducing consumption should fall primarily on the "rich" in the developed

16. *World Business Briefing Asia: India: Honda to Expand Car Output*, N.Y. TIMES, July 4, 2006, at C6 (noting that Honda plans to double its national output); Michelle Maynard & James Brooke, *Toyota Closes in on G.M.; Signs Point Toward Japanese Maker Being the Top Seller Soon*, N.Y. TIMES, December 21, 2005, at C1. GM plans to increase its production in China by 15-20 percent making China GM's second biggest market behind the United States. Brooke, *supra* note 16, at C2.

17. AL GORE, *EARTH IN THE BALANCE: ECOLOGY AND THE HUMAN SPIRIT* (1992); Michael P. Vandenberg & Anne C. Steinemann, *The Carbon Neutral Individual*, 82 N.Y.U. L. REV. 1673, 1702 (2007) (Michael Vandenberg is a Law Professor and Co-Director of the Regulatory Program at the Vanderbilt Center for the Study of Religion and Culture; Anne Steinemann is a Professor of Civil and Environmental engineering and Public Affairs at the University of Washington). Meyerson, *supra* note 1, at 115-30.

18. See generally MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, *A MONETARY HISTORY OF THE UNITED STATES, 1867-1960* 299-419 (1963).

19. Editorial, *The Other Nano*, N.Y. TIMES, Jan. 16, 2008, at A22.

nations rather than on those hoping to emerge from poverty in the developing nations, apparently in the hopes that critics of such an agenda would not recognize that for every high consuming westerner there are thousands of poverty-stricken humans striving for a better life in the developing nations. Such cynicism was only exacerbated when Al Gore, taken to task for traveling by private jet and heating his palatial 10,000 square foot homes at the same time as he was urging lesser mortals to "cut their consumption," responded by claiming that he had "purchased" on the carbon market the right to pollute and spew excess carbon into the atmosphere.²⁰

Perhaps most illustrative of this agenda is the goal set by the International Panel on Climate Change, which proposed a ceiling of 2.8 billion tons of carbon in the atmosphere.²¹ Under this ceiling, each human on earth would be allotted an average of .53 tons of carbon a year, or about the same level as "Burkina Faso, the 13th poorest country in the world."²²

In short, directing environmental policy toward the "C" factor is neither practical, nor humane. In the mid-1980s, Romanian dictator Ceausescu could simply order that the heat be cut off all across the country in the middle of winter in order to "reduce consumption."²³ But the notion that such mandatory reductions in consumption are practical in any society which values human dignity and respects the dreams of the teeming millions in the developing world for a better life is as illusory as the quest for environmental salvation in the "U" factor of Holdren's equation.

III. THE "P" FACTOR

The sole remaining factor in the Holdren equation is population. However, so seductive have been the political appeals of those whose agenda rests on emphasizing the "U" and "C" components of Holdren's equation, that very few of the "10,000 hopelessly decentralized (environmental) groups competing for funds"²⁴ even recognize the "P" factor

20. Press Release, Tennessee Center for Policy Research, Al Gore's Personal Energy Use Is His Own Inconvenient Truth: Gore's Home Uses More than 20 Times the National Average (Feb. 26, 2007), available at http://www.tennesseepolicy.org/main/article.php?article_id=367; CBSNews.com, *Gore Defends Mansion's Power Consumption*, Feb. 28, 2007, <http://www.cbsnews.com/stories/2007/02/28/politics/main2522844.shtml>; Peter Schweizer, *Gore Isn't Quite as Green as He's Led the World to Believe*, USA TODAY, Dec. 12, 2006, available at http://www.usatoday.com/news/opinion/editorials/2006-08-09-gore-green_x.htm.

21. See HARDAWAY, *supra* note 1, at 163.

22. *Id.* (citation omitted).

23. Avner Ben-Ner & J. Michael Montias, *The Introduction of Markets in a Hypercentralized Economy: The Case of Romania*, 5(4) J. OF ECON. PERSP. 163, 164-65 (1991) (Avner Ben-Ner is a Professor of Industrial Relation at the University of Minnesota; Michael Montias is a Professor of Economics at Yale University); Ronald H. Linden, *Socialist Patrimonialism and the Global Economy: The Case of Romania*, 40(2) INT'L ORG. 347, 352, 362, 366 (1986).

24. Robert M. Hardaway, *Environmental Malthusianism: Integrating Population and Environmental Policy*, 27 ENVTL. L. 1209, 1217 (1997) (citation omitted).

as fundamental to any realistic plan for reducing mankind's ecological footprint on the earth. Government too has neglected the "P" component, preferring to spend billions on the more politically acceptable, though largely futile, "C" and "U" agendas.

For both government and private environmental groups, the reason for avoiding the "P" agenda may be the same. Environmental groups find it far easier to raise funds by distributing lavish color brochures showing heart-rending pictures of bludgeoned baby seals than by raising sensitive population-related issues such as family planning, abortion, or illegal immigration. For many of these 10,000 environmental groups, ranging from the Xerces society, which promotes the preservation of snails and slugs, to the National Campaign to Stop Radiation Exposed Food, the top priority has become self-perpetuation of themselves as active entities. As environmentalist Tom Wolf has observed:

The environmental organizations courted disaster when they "succeeded" American style. When they got too big, too rich and too remote from the environmental effects of their actions. Most of all when we abandoned moral appeal for fund-raising appeals, when we substituted holy war against the infidel for the sweet science of swaying souls. Like our competitors in organized religion, especially the televangelists, we enviros lost our credibility when we bought into the junk mail business. When the salvation we offered lost out to our insatiable need for money. Poverty, chastity and obedience wilted before the prospect of empire and power, "careers" in the institutionalized environmental movement.²⁵

Meanwhile, every one third of a second (about the speed a machine gun flies its bullets) the planet makes room to accommodate one additional human being. To accommodate each additional human, 2,000 cubic meters of scarce fresh water must be drawn every year and 207 gigajoules of energy produced.²⁶ To accommodate these new humans, 100 acres of rainforest are destroyed every minute and one entire species sacrificed every day.²⁷ Each new human's waste products include his share of 270,000 metric tons of methane dumped annually into the world's oceans, and 30,000 metric tons of sulfur and 80,000 metric tons of carbon monoxide released into the atmosphere.²⁸ When he dies, his epitaph is written on a monument of waste and garbage 4,000 times his body weight.²⁹

It has been estimated that simply making voluntary family planning programs available to every woman in the world would stabilize both the

25. Tom Wolf, *The Rise and Fall of the Environmental Movement*, L.A. TIMES, Mar. 24 1991, at M6 (ellipses indicating deletions are omitted).

26. HARDAWAY, *supra* note 1, at 17.

27. *Id.*

28. *Id.*

29. *Id.*

population and the ecological footprint of mankind³⁰—without implementing mandatory controls of the kind implemented in China and India. However, cultural, religious, and legal obstacles worldwide continue to inhibit the implementation of such programs.³¹

In countries where religious or cultural concerns constrain making family planning programs available, governments decline to take on such challenges and instead take the course of least resistance by exporting the excess humans for whom they cannot provide—a course of action made possible only by the refusal of the human-importing countries such as the U.S. to enforce their own immigration laws.³²

Despite evidence that countries that lack family planning services have the highest abortion rates,³³ while countries permitting abortion on demand but making family planning services available to all (such as Holland) have the lowest abortion rates,³⁴ many countries around the world persist in criminalizing abortion and denying family planning services to the poor. Even in the U.S., laws forbid granting funds to poor mothers to have abortions or to plan their families.³⁵

Despite so much opportunity for moderating the ecological footprint of mankind on the earth by addressing the “P” factor in Holdren’s equation, few environmental groups are willing to give up the junk mail business to take up the cause of family planning or illegal immigration. Even such high profile environmental groups as the Sierra Club continue to refuse to raise population-related issues in such areas as immigration.³⁶

In 1992, a sign posted at William Clinton’s election headquarters read, “It’s the economy, stupid.”³⁷

30. *Id.* at 165.

31. See, e.g., JOHN A. ROBERTSON, CHILDREN OF CHOICE: FREEDOM AND THE NEW REPRODUCTIVE TECHNOLOGIES 24 (1994); Paula Abrams, *Population Control and Sustainability: It's the Same Old Song but with a Different Meaning*, 27 ENVTL. L. 1111, 1113 (1997); Albert P. Blaustein, *Arguendo: The Legal Challenge of Population Control*, 3 LAW & SOC'Y REV. 107, 109 (1968); Reed Boland, *The Environment, Population, and Women's Human Rights*, 27 ENVTL. L. 1137, 1157 (1997); Johnson C. Montgomery, *The Population Explosion and United States Law*, 22 HASTINGS L.J. 629, 629 (1971); Amartya Sen, *Fertility and Coercion*, 63 U. CHI. L. REV. 1035, 1041 (1996).

32. See Nicholas R. Montorio, Note, *The Issue of Mexican Immigration: Where Do We Go from Here*, 6 J. INT'L BUS. & L. 169, 186 (2007); Lou Dobbs, *Enforce the Immigration Laws We've Got*, CNN.com, Jul. 16, 2004, <http://www.cnn.com/2004/US/07/16/broken.borders/index.html>.

33. See HARDAWAY, *supra* note 1, at 110.

34. *Id.* (citation omitted).

35. *Id.* at 111 (citation omitted); see also *Rust v. Sullivan*, 500 U.S. 173 (1991).

36. SIERRA CLUB, SIERRA CLUB CONSERVATION POLICIES—POPULATION (Nov. 17, 2007), available at <http://www.sierraclub.org/policy/conservation/population.pdf> (containing no position on immigration levels or on policies governing immigration into the United States).

37. Gwen Ifill, *The 1992 Campaign: Political Memo; Clinton's 4-Point Plan to Win the First Debate*, N.Y. TIMES, Oct. 9, 1992, at A21.

It is now time for a sign to be posted in the halls of both government and the representatives of the environmental movement: "It's the population, stupid."

As a tool for reducing the carbon emissions of units of consumption, carbon markets fall clearly with the "U" factor of Holdren's equation, and as such run the risk of becoming mired in the self-defeating "circle game" about which former EPA director Lee Thomas expressed such concern.

Nevertheless, keeping in mind that even if carbon markets do nothing more than transfer carbon emissions from the air to the soil, they may nevertheless be of some value, even if for no other reason than by helping to clear the air, they may buy humankind time in dealing with global warming, which is largely a function of greenhouse gases.

But do carbon markets work? In analyzing that question, it is important to recognize that the challenge is to quantify the advantages and disadvantages of carbon markets so that current markets can be evaluated and a realistic, efficient, and fair plan devised for future implementation in countries where no such plans are currently implemented.

The two main "Cap and Trade Schemes"³⁸ currently implemented are the U.S. Acid Rain Market³⁹ and the European Emissions Trading Scheme (EU ETS).⁴⁰ Both of these schemes, typically described as "Cap

38. In a cap-and-trade program, "a State (or country) caps its total emission of a certain pollutant at some target amount." Nadia Zakir, *Emission Trading Initiatives: Responding to Climate Change through Market Forces*, ABA BUSINESS LAW TODAY, August 2007, available at <http://www.abanet.org/buslaw/blt/2007-07-08/zakir.shtml>. The cap defines the total number of emission allowances an emitting firm has the right to emit, each allowance correlates to a specific quantity of a pollutant. *Id.* The initial policy formulation will determine whether allowances are sold through an auction, directly, or indirectly. *See id.* Those emitting firms that are able to produce below their allowance level can sell their excess allowances to firms where it is uneconomical to reduce their carbon emission. *See id.* Therefore, carbon emissions are reduced through the placement of a market value on the right to pollute. *See id.*; *see also* STEPHEN BYGRAVE & MARTINA BOSI, LINKING PROJECT-BASED MECHANISMS WITH DOMESTIC GREENHOUSE GAS EMISSION TRADING SCHEMES 11 (2004); DALLAS BURTRAW, KAREN PALMER & DANNY KAHN, ALLOCATION OF CO₂ EMISSIONS ALLOWANCES IN THE REGIONAL GREENHOUSE GAS CAP-AND-TRADE PROGRAM 1 (2005); Harrison & Radov, *supra* note 1, at 264-66; ENVIRONMENTAL PROTECTION AGENCY, TOOLS OF THE TRADE: A GUIDE TO DESIGNING AND OPERATING A CAP-AND-TRADE PROGRAM FOR POLLUTION CONTROL 1 (2003).

39. Eric Shaffner, Comment, *Repudiation and Regret: Is the United States Sitting out the Kyoto Protocol to Its Economic Detriment?*, 37 ENVTL. L. 441, 454 (2007); Eric C. Bettelheim, Richard L. Sandor & Ian R. Swingland, *An Overview of a Free-Market Approach to Climate Change and Conservation*, 360 PHILOSOPHICAL TRANSACTIONS: MATHEMATICAL, PHYSICAL, AND ENGINEERING SCIENCE 1607, 1612 (2002) ("Direct monitoring of emissions is used by to verify that the cap is achieved and to insure the value of tradable allowances.").

40. The EU ETS was established as a cost effective mechanism to comply with the commitment made by the European Union to the Kyoto Protocol. *See* Council Directive 2003/87/EC, art. 1, 2003 O.J. (L 275) 32. The program is designed to regulate 46 percent of the EU's CO₂ emissions. Justin Guest, *Project Based Mechanisms & the European Emissions Trading System*, COMMODITIES NOW, September 2003, at 1, available at <http://www.commodities-now.com/content/market-areas/general/ma-article-5.pdf?PHPSESSID=34967b>. The directors established an allowance allocation policy that was consistent with the Member State's obligation under the EU Burden Sharing Agreement. *See* Council Directive 2003/87, art. 11, 2003 O.J. (L 275) 36 (EC). Within the first two

and Trade” schemes, are based on governmental establishment of emissions targets, which may be met by covered industries either through actual compliance with those targets or by purchase of the rights to exceed emission targets from other industries whose emissions are below the established emissions targets.⁴¹

Voluntary cap and trade programs currently implemented include the Chicago Climate Exchange Program and the Kyoto Protocol Clean Development Mechanism. Pending mandatory programs are the Regional Greenhouse Gas Initiative, the California Global Warming Solutions Act, and the Climate Stewardship Act of 2007.

The purported advantages and disadvantages of each of these markets are currently undergoing considerable debate. Advocates of these programs cite the provision of economic incentives for industries to innovate in finding technological means of reducing carbon emissions and thereby serving the ultimate goal of reducing world carbon production.⁴² Critics cite the economic burden on industry and the inevitable economic burden placed on consumers, as well as instability caused by volatile carbon markets, including misallocated investment incentives triggered by uncertainties in the future costs of carbon emission rights.⁴³

Accordingly, a sub-debate has focused on the relative economic merits of a carbon market and a direct carbon excise regimen imposed on industry, since both would presumably provide incentives for innovation in carbon reducing technologies and both would result in a reduction of global emissions of greenhouse gases.

Eric Toder, of the Urban Institute and Urban-Brookings Tax Policy Center, has recently released several studies analyzing the distributional effects of a carbon tax, and compared those effects with those of cap and trade programs, and found that since “any quantity restriction (cap and trade) implies a change in the market prices because the permits are scarce,” it follows that a “tax equal to the permit price would generate

phases, allowances are distributed on the basis of grandfathering or using industry benchmarks. Harrison & Radov, *supra* note 1. The allowances are then bought, sold, and traded in a carbon market. See, e.g., Council Directive 2003/87, art. 12, 2003 O.J. (L 275) 36 (EC); EU ACTION AGAINST CLIMATE CHANGE, EU EMISSIONS TRADING: AN OPEN SYSTEM PROMOTING GLOBAL INNOVATION 9 (2007), available at http://ec.europa.eu/environment/climat/pdf/bali/eu_action.pdf.

41. See, e.g., EU ACTION AGAINST CLIMATE CHANGE 3, 9 (2007), available at http://ec.europa.eu/environment/climat/pdf/bali/eu_action.pdf; U.S. EPA, CAP AND TRADE: ACID RAIN PROGRAM BASICS 1-2, <http://www.epa.gov/airmarket/cap-trade/docs/arbasics.pdf> (last visited Mar. 22, 2008).

42. E.g., Environmental Defense Fund, *The Cap and Trade Success Story*, Feb. 12, 2007, <http://www.edf.org/page.cfm?tagID=1085>.

43. See ARTHUR LAFFER & WAYNE WINEGARDEN, THE ADVERSE ECONOMIC IMPACTS OF CAP-AND-TRADE REGULATIONS 2, 4-5, 7, 13-14, 16 (2007), available at http://www.arduinlaffermoore.com/PDF/Cap_and_Trade_Economic_Analysis_September_2007.pdf.

the same reduction in consumption.”⁴⁴ He therefore concludes that “cap and trade proposals affect consumers the same way as a carbon excise tax that is equal to the market-determined permit price.”⁴⁵

In other words, the same carbon-reducing effects can be achieved through either cap and trade or carbon excise taxes, depending only upon the target caps set in cap and trade and the amount of tax set under an excise protocol.

What is clear from such studies, however, is that both carbon markets and carbon excise taxes have the potential of imposing enormous economic costs on society depending on the target levels of carbon emissions set under cap and trade or the amount of the tax set under a carbon excise tax program. If the levels are set low or the taxes high, the reduction in carbon emissions is likely to be greater, but the effects on an economy more severe. If the levels are set high and the taxes low, the effects on the economy will be less severe, but the effect on carbon reduction relatively minimal. In the end, political considerations will determine the amount of amount of tax or emissions levels, just as they determine the imposition of any other tax.

In either case, the question must be asked whether society’s resources are best spent on the “U” component of Holdren’s equation, particularly when such expenditures in the past have been shown to have such a relatively insignificant impact on mankind’s ecological footprint on the earth. For all the billions spent on this component, carbon production today is greater than at any time in the history of the earth. The notion that we can save the earth by taking one step forward (by modest linear reductions in carbon emissions of individual units of consumption), while at the same time taking three steps backward (by increasing exponentially the number of individual units) is akin to rearranging the deck chairs on the Titanic.

Although the Titanic analogy has become much overused, it is particularly descriptive of current environmental policy. Governments are busy transferring toxic wastes from the first class to third class compartments, or shuffling carbon from the air to the engine room. Demagogic ship officers are engaged in encouraging passengers not to use so many chairs, or advocating that more people be squeezed on to each chair, while others busy themselves in producing more chairs. Still others scurry about trying to find the dwindling supply of chairs per person. Meanwhile the entire ship is sinking under the weight of an exponentially expanding population.

44. Dr. Eric Toder, Urban Institute and Urban-Brookings Tax Policy Center, Address at the *Denver University Law Review* Symposium: Who Should Pay for Reducing Global Warming? 1 (Feb. 15, 2008) (transcript on file with author).

45. *Id.* at 5.

CONCLUSION

For every dollar governments expend on the “U” component, only pennies are spent on the “P” component, the subcomponents of which are family-planning programs, government funding of abortions, tax reform that encourages family planning rather than rewards and subsidizes large families, and enforcement of immigration laws that would encourage human-exporting countries to deal with population pressures within their countries by addressing the rights of women, as well as lowering the cultural, legal, and economic barriers to family planning, rather than by taking the course of least resistance of exporting their excess humans to developed countries.

If any real progress is to be made in protecting the global environment for our children and grandchildren, these priorities must be reversed.

